

**USE OF THIOESTER FLAVORS TO IMPROVE
THE FLAVOR QUALITY OF
READY-TO-DRINK COFFEE UPON
RETORTING AND STORAGE**

FIELD OF THE INVENTION

[0001] The present invention relates to the field of ready-to-drink (RTD) coffee. In particular, the present invention relates to the addition of thioesters such as methyl, ethyl, prenyl, or furfurylthioacetates or blends thereof as flavor precursors to RTD coffee and optimizing thermal processing conditions to initiate a chemical reaction converting the thioacetate into a thiol form at a targeted rate in order to impart enhanced flavor qualities during consumption after thermal processing and storage.

BACKGROUND OF THE INVENTION

[0002] For preparing an RTD coffee, typically coffee extract powder or liquid coffee extract is dissolved in water, into which coffee aroma is added together with optional additives such as bicarbonate and sugar. Then, the resulting solution is thermally processed. The level of volatile coffee aroma compounds, in particular sulfur and nitrogen compounds, decreases and the coffee acidity increases upon thermal processing as well as during storage, thus negatively affecting the flavor quality of RTD.

[0003] Methylthiol and furfurylthiol are key aroma compounds in coffee imparting the roasted and coffee flavor attribute (O. G. Vitzthum, P. Werkhoff. Measurable changes of roasted coffee aroma in oxygen-permeable bag packs. *Chemie, Mikrobiologie, Technologie der Lebensmittel*, 1979, 6(1), 25-30.). The flavor precursors, methyl and furfurylthioacetate, which generate methylthiol and furfurylthiol, respectively, through hydrolysis, are chemically more stable towards oxidation in comparison to the corresponding thiols. Methyl and furfurylthioacetate have been identified in coffee (I. Flament, *Coffee Flavor Chemistry*, John Wiley & Sons, LTD., 2002). U.S. Pat. No. 3,702,253 discloses examples of adding flavor agents such as furfurylthioacetate alone or in combination with other sulfur flavor compounds to soluble coffee to modify the flavor of soluble coffee. These flavor agents can be added at a convenient step in the soluble coffee process such as plating the dried soluble coffee solids with a desired dilution of the flavor agent in an acceptable solution followed with drying. The flavor agents in solid or liquid form may also be added directly to a concentrated coffee extract and the mixture dried into a soluble coffee product which contains the flavor agent as an integral part thereof. The flavor agents may be incorporated into a dry powder beverage with or without whitener.

[0004] Thiol compounds such as furfurylthiol (FFT) have a much better flavor and aroma contribution than thioacetate compounds. However, thiol compounds degrade rapidly and readily, leaving the RTD product with little remaining aroma/flavor benefit. In contrast, thioacetate compounds such as furfurylthioacetate (FFT-Ac) are more durable than thiols, but do not provide the same degree of flavor and aroma benefit as the more easily-degraded thiol compound.

[0005] Typically, flavor agents are added late in the manufacturing process, as it is known that additional processing steps such as retorting can cause flavor loss and an increase in acidity, and these contribute to a reduction of flavor quality, particularly upon extended storage of the product. Although

somewhat successful attempts have been made to alleviate the effect of thermal processing on flavor loss and acidity increase, the problem of flavor quality degradation upon storage still remains to be solved. The present invention now resolves these problems.

SUMMARY OF THE INVENTION

[0006] The present invention overcomes the problems of the prior art by defining a method to maintain a constant supply of the rapidly-degraded thiol compounds. With this method, it is now possible to produce a thermally processed RTD coffee beverage having enhanced flavor and aroma features which last for at least 4 months at ambient temperature.

[0007] In particular, the present invention satisfies the need of the industry by adding thioesters such as thioacetates as flavor precursors to a coffee product prior to the thermal process and optimizing the thermal processing conditions to initiate a continuous chemical reaction that converts the thioesters or thioacetates into thiols. For example, the conversion of thioacetates into thiols takes place at a rate equal to the degradation rate of the thiol, thus ensuring that the beverage contains a sufficient amount of thiol compound to maintain a balanced flavor and aroma for a prolonged period. By adjusting the thermal process conditions, the rate at which the thioacetates are converted into thiols can be optimized in order to ensure that the beverage contains sufficient thiol quantities that the flavor and aroma remain balanced for a prolonged period. In one embodiment, FFT-Ac and methylthioacetate (MT-Ac) are converted to FFT and methylthiol, respectively, at a rate to compensate for the loss of methylthiol (MT) and FFT during thermal processing and storage, thus transforming the resultant RTD coffee from a more "soluble coffee"-like taste to a more "freshly brewed"-like coffee taste during consumption. In another embodiment, prenylthioacetate was incorporated.

[0008] The invention also relates to a thermally processed and stored ready-to-drink liquid coffee product comprising a coffee extract, a stabilizer, a buffer, water and a thioester flavor precursor in an amount sufficient to provide improved flavor quality to the product after thermal processing and storage of the liquid product for more than 4 months at ambient temperature and for more than 1 month at 60° C. storage.

[0009] The invention also relates to a method for preparing a ready-to-drink liquid coffee product having improved flavor quality comprising adding a thioester flavor precursor to the liquid product and thermally processing the resulting product. Advantageously, the thioester flavor precursor is added in an amount sufficient to provide improved flavor quality to the product after thermally processing and storage of the liquid product for more than 4 months at ambient temperature and for more than 1 month at 60° C. storage.

[0010] The liquid product to be thermally processed is typically filled into cans having a nitrogen gas containing headspace. Advantageously, the flavor precursor is added as a solution of 1-10% in ethanol.

[0011] In these products and methods, the thioester flavor precursor is preferably furfurylthioacetate, methylthioacetate, prenylthioacetate or a mixture thereof, and is present at between about 0.005 to 7 mg/kg, preferably between about 0.1 to 5 mg/kg. The product may also include at least one sweetener or at least one whitener for coloring and flavoring of the beverage.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIGS. 1A-D show the degradation of furfurylthioacetate at 38° C. (curves A and B) or 60° C. (curves C and D) in black RTD coffee.